

RECOGNITION OF TWO SPECIES IN THE PINE FEEDING  
"NEODIPRION FULVICEPS COMPLEX" (HYMENOPTERA:  
DIPRIONIDAE) OF WESTERN UNITED STATES

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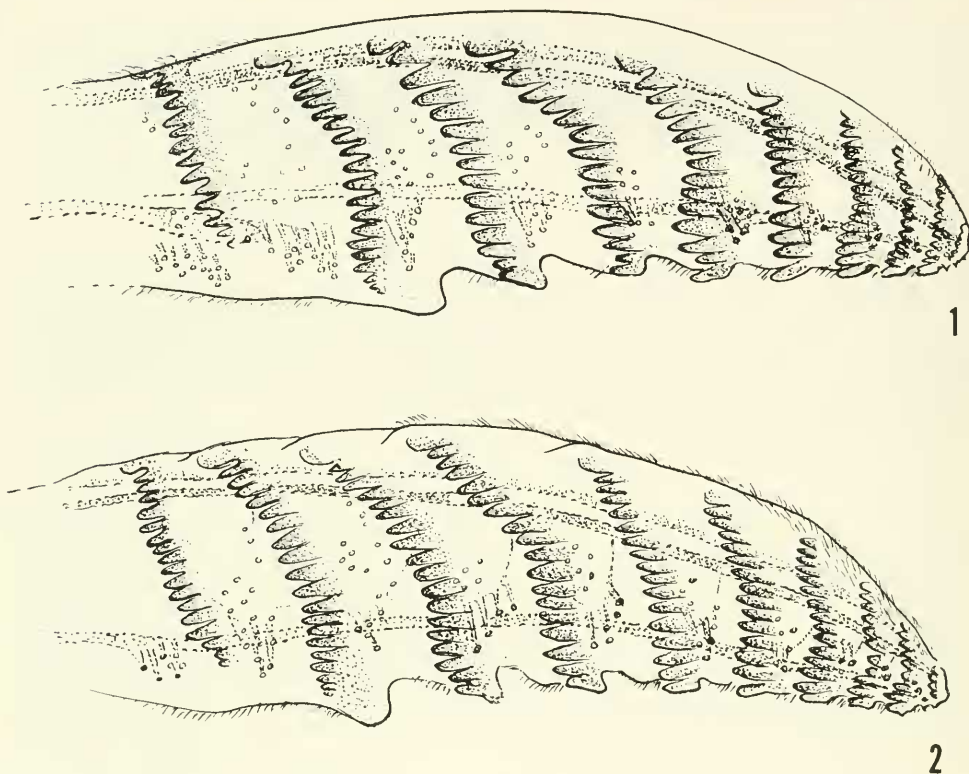
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*Abstract.*—Two species are recognized in the *Neodiprion fulviceps* complex as previously defined. Biological differences in Arizona populations on *Pinus ponderosa* and subsequent discovery of consistent differences in the morphology of the female lancet and coloration of the females and larvae support this separation. *Neodiprion fulviceps* (Cresson) is restricted to those populations that emerge as adults in the spring and overwinter as prepupae in a cocoon. *Neodiprion autumnalis*, n. sp., is described for those populations that emerge as adults in the fall and overwinter as eggs in the needles.

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Most western populations of *Neodiprion* associated with *Pinus ponderosa* Dougl. ex Laws., as well as *Pinus jeffreyi* Grev. & Balf. and some other pines, have been referred to the "*Neodiprion fulviceps* complex" based on Ross's (1955) definition. This complex has been very confusing due to apparent biological differences between different populations and the lack of consistent morphological features for adults or larvae upon which to segregate species. Regarding this, Ross (1955) stated "Large numbers of collections from *Pinus ponderosa* provide the most puzzling questions in this genus. It is possible that all these are in a single species, perhaps represented by a number of fairly well-marked geographic races. If so the name *fulviceps* (Cresson) described from Nevada, might apply."

Biological data and comparisons of adults and larvae are necessary to help unravel some of the problems. A study in Arizona by the junior author revealed distinct differences in the biology of two populations (Wagner et al., 1986). Further studies revealed color and structural characters in the female and coloration of the larvae that could also be used to separate individuals of the populations. These differences were consistent within the different populations studied by the junior author and warrant recognition of two distinct species. Adults of both are referred to the *N. fulviceps* complex of Ross. Study of the type of *L. fulviceps* Cresson, the lancet of which had never been removed and examined, revealed that the name *fulviceps* applies to the species which overwinters in a cocoon and emerges in the spring. The other populations, those in which adults emerge in the fall and overwinter in the egg stage, are here regarded as a new species. These two species are



Figs. 1, 2. Female lancets. 1, *Neodiprion autumnalis*. 2, *N. fulviceps*.

separated and described and *N. fulviceps* is defined and restricted to a smaller group of *Neodiprion* than that which Ross (1955) defined. The present work does not solve all the problems in the complex, but does verify the existence of more than one species and solves the immediate problem of the Arizona populations. It should be emphasized that taxonomic work on and the identification of the western *Neodiprion* populations cannot always be based on morphology alone; associated biological data are of utmost importance.

#### THE "NEODIPRION FULVICEPS COMPLEX"

Ross (1955) defined the *fulviceps* complex in his key, essentially by the following characters: mesoscutellum nearly impunctate (as all species of the *sertifer* group); occurring west of the 100th meridian; annuli 3 and 4 of female lancet end above rod (not below rod as in *N. demoides* Ross); dorsum light, red or red yellow (dorsum black or mostly black, head black or with black stripe between eyes in *N. gillettei* (Rohwer), *N. mundus* Rohwer, and *N. ventralis* Ross); scopa long (not short as in *N. edulicola* Ross); and larger species, 10–11 mm long that feeds on *Pinus ponderosa*. Though coloration is commonly variable in sawflies, and size and host are not always characteristic, comparison of the specimens of the Arizona populations with those species in couplets 28–33 of Ross' key excluded them from other species and placed them within his definition of *N. fulviceps*. There being only one name available in the *fulviceps* complex, the type of *fulviceps* was bor-

rowed and the female lancet was pulled out and examined to determine which, if either, of the Arizona populations the name *N. fulviceps* might apply. It was discovered that *N. fulviceps* was identical to the populations that overwinter as cocoons and that emerge as adults in the spring of the following year; it is a generally dark species and is apparently a species that is not as common in the West as the other population described below as *N. autumnalis*.

Reared material of the *fulviceps* complex in the National Museum of Natural History was studied, and most all must be referred to *N. autumnalis* based on characters of the female lancet as well as emergence dates of the adults. This includes specimens from Willits, California, for which Dahlsten (1961) reported biological data. Using *N. fulviceps* in the restricted sense as here defined, *N. autumnalis* replaces *N. fulviceps* as the more common complex in the West, a complex that may eventually be broken down further as more information becomes available. Dahlsten's (1966) study of "*fulviceps*" in several study areas in California on *Pinus jeffreyi*, *P. ponderosa*, and *P. radiata* have a life cycle similar to *N. autumnalis* and examination of some of the specimens on which Dahlsten's study is based showed that they belong to this complex. However, Dahlsten found differences in the populations studied including number of eggs per female, number of needles in each fascicle used for oviposition, number of eggs inserted in each needle, spacing of egg pockets, egg color, number of feeding instars, dates of larval eclosion, larval size, and larval feeding capacity. Because Dahlsten found no morphological characters coinciding with these differences, it is difficult to assess their importance. At present, the name *autumnalis* may be applied to individuals of the populations studied by Dahlsten.

### *Neodiprion fulviceps* (Cresson)

*Lophyrus fulviceps* Cresson, 1880: 25.

Type female.—Length, 9.0 mm. Head dark orange with narrow black stripe between ocelli, darker orange than pale areas of thorax and legs; antenna black, scape slightly paler. Thorax with pronotum and mesepisternum whitish, mesonotum mostly black with sutures and scutellum lighter black to gray; metanotum black; remaining parts dull orange. Abdomen black above, with whitish lateral longitudinal stripes; venter pale orange. Legs light orange with bases of tibiae and coxae more whitish. Wings hyaline; veins brownish to black, costa and stigma paler, more orange. Antenna 18-segmented. Lancet as in Fig. 2 (drawing from Arizona populations and compared with type of *fulviceps*); characterized by features given in Table 1.

Arizona populations.—Agreeing with type in structure and most color characters. Color somewhat variable, especially amount of black on mesonotum which at one extreme may be restricted to black marks on the lateral lobes and prescutum; darkest extreme is that of the type specimen. Abdomen usually black dorsally and venter sometimes suffused with black. Typical specimens examined from Arizona slightly paler than type.

Male.—Similar to *N. autumnalis*.

Larva.—Late instar length, 17–22 mm. Head orange with eyespot black, sometimes with blackish mark on frons; thoracic legs mostly black (femora, tibiae, and tarsi may be whitish to orange, but not as dark orange as head). Body with 2

Table 1. Comparison of characters separating *Neodiprion autumnalis* and *N. fulviceps*.

	<i>N. autumnalis</i> , n. sp.	<i>N. fulviceps</i> (Cresson)
Lancet:	Fig. 1. 1st and 2nd annuli farther apart; 1st annulus shorter, usually with 10–11 teeth. Annuli 3–5 end near top of rod. Teeth of 3rd annulus about same size. Serrulae 1 and 2 straighter. 1st serrula longer than its depth.	Fig. 2. 1st and 2nd annuli closer together; 1st annulus longer, usually with 15–16 teeth. Annuli 3–5 overlap rod and end near dorsal edge of lancet. Ventral teeth of 3rd annulus usually larger than dorsal teeth. Serrulae 1 and 2 more directed ventrally. 1st serrula as long as or shorter than its depth.
Color:	Head and pale markings of thorax and legs more uniform. Mesonotum usually pale orange with black streaks on lateral lobes. Abdomen mostly orange with whitish lateral longitudinal stripes, sometimes blackish dorsally.	Head usually much darker orange than pale orange to whitish markings of thorax and legs. Mesonotum mostly black, prescutum sometimes paler and scutellum and sutures white to orange. Abdomen commonly black or mostly black dorsally with more contrasting lateral longitudinal stripes.
Larva:	Fig. 3. Head orange, usually median black streak on dorsum. Body without black below spiracles.	Fig. 4. Head orange, sometimes blackish on frons. Body usually with two black stripes, sometimes broken into spots, below spiracles.
Biology:	Overwinters as egg; adults emerge in fall of same year.	Overwinters as prepupa in cocoon; adults emerge in spring of following year.

subdorsal longitudinal black stripes and usually with 2 subspiracular black stripes, though one just below spiracles may be light or broken (Fig. 4).

Biological data.—On *Pinus ponderosa*. Larvae feed in spring and early summer, overwinter in cocoons in the soil, and adults emerge early the following spring (Wagner et al., 1986).

Type.—Female, at The Academy of Natural Sciences of Philadelphia, Pennsylvania, labeled “Nev.,” “Type No. 292.1.”

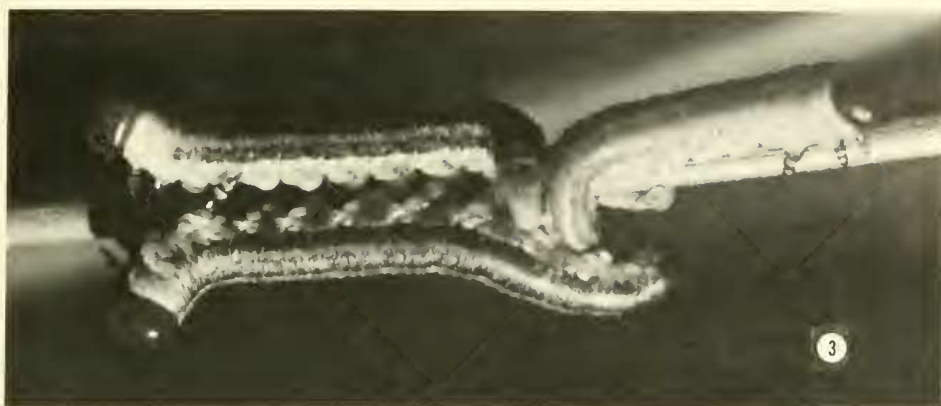
Specimens examined.—Arizona, nr. I-40, Flagstaff, Coconino Co., VII-21-1982, pupated by VII-29-1982, emerged by V-16-1983 to V-20-1983. About 60 specimens examined.

Notes.—See Table 1 for differentiating features of the female lancet. This in conjunction with Fig. 2 should characterize *N. fulviceps*. The Arizona specimens are the only ones I have seen that I can associate with this species.

#### *Neodiprion autumnalis* Smith, NEW SPECIES

Female.—Length, 8.5–10.0 mm. Head orange, similar to orange markings of thorax and legs; narrow black mark between ocelli and narrow black streak in each lateral suture of postocellar area; antenna black with scape, pedicel, and all or most of 1st flagellar segment reddish brown. Thorax pale orange with black





Figs. 3, 4. Larvae. 3, *Neodiprion autumnalis*. 4, *N. fulviceps*. (Photographs by M. R. Wagner.)

stripes on each mesonotal lateral lobe; posttergite and metanotum black; sometimes blackish or infuscated area on mesoprescutum. Abdomen pale orange with whitish lateral longitudinal stripes, sometimes blackish marks at center of terga. Legs pale orange with basal  $\frac{1}{4}$  of tibiae and coxae more whitish. Wings hyaline; veins brownish, stigma paler to orange. Antenna 16–19 segmented. Lancet as in Fig. 1, characterized by features given in Table 1. Scopa of sheath as in Fig. 25 of Ross (1955).

Male.—Length, 7.5–8.5 mm. Black; labrum and legs beyond coxae yellow orange.

Larva.—Late instar length 17–22 mm. Head orange with eyespot black, usually with black medial stripe on dorsum. Thoracic legs orange, black only lining edges of sclerites; black ventral stripe usually present between thoracic legs to abdomen. Body with subdorsal black longitudinal stripes; no black below spiracles (Fig. 3).

Biological data.—On *Pinus ponderosa*. Adults emerge in the fall and oviposit; eggs overwinter in the needles, and larvae hatch and feed in the spring (Wagner et al., 1986).

Holotype.—Female, labeled “Springerville, Apache Co., AZ, VIII-13-1981, coll.

as pupa in soil, on *Pinus ponderosa*, coll. by M. R. Wagner." In the National Museum of Natural History, Washington, D.C.

Paratypes.—Springerville, Arizona, collected as larvae VII-8-1982, pupated by VII-21-1982, emerged XI-1982 (27 ♀, 32 ♂); Springerville, Arizona, collected as larvae VII-14-1980, emerged Nov. 1980 (12 ♀, 3 ♂); Camp Verde, Yavapai Co., Arizona, collected as larvae V-18-1981, pupated VI-1981, emerged XI-XII-1981, on *Pinus ponderosa* (5 ♀, 2 ♂); 5.0 mi S Flagstaff, Coconino Co., Arizona, collected as larvae V-26-1981, pupated VI-1981, emerged XI-XII-1981 (3 ♀, 1 ♂). In the National Museum of Natural History, Northern Arizona University, and the Canadian National Collection, Ottawa.

Notes.—Comparison of characters in Table 1 and Fig. 1 will differentiate this species from other species of *Neodiprion*. The lancet is similar to that of *N. ventralis* Ross in that the first serrula is rather long. However the first serrula of *N. ventralis* is much larger, nearly twice as long as its depth, whereas the first serrula of *N. autumnalis* is only slightly longer than its depth. I have not found characters in males to separate them from males of other species.

I have seen specimens from California, Oregon, and Montana that may be referred to this species.

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